



# STUDIES

A SPECIAL REPORT SERIES BY THE N.C. DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES  
STATE CENTER FOR HEALTH AND ENVIRONMENTAL STATISTICS  
P.O. BOX 29538, RALEIGH, N.C. 27626-0538

No. 61

December 1991

## DIABETES SURVEILLANCE: DIABETES MORTALITY IN NORTH CAROLINA FROM 1980 THROUGH 1989

by

Lee A. Sullivan

### ABSTRACT

North Carolina resident death certificate data for 1980 through 1989 were used to draw conclusions regarding (1) the roles of age, race, and sex in diabetes-related mortality and (2) recent temporal trends.

The number of deaths, crude mortality rate, and age-adjusted mortality rate in the general population all increased from 1980 through 1989. Nonwhite females had the highest of the race/sex-specific rates, although the increase for nonwhite males was the greatest over the period. After adjustments for age, neither white males nor white females demonstrated a significant trend. However, age adjustments exacerbated the increase for nonwhite males relative to other race/sex groups (although the rate for nonwhite females was still considerably higher than that for nonwhite males).

In contrast, age-adjusted mortality rates within the diabetic population revealed that nonwhite male diabetics had the greatest risk of dying from a diabetes-related cause. Moreover, that risk increased over 16 percent from 1980 through 1987. The rate for white male diabetics declined 24 percent, taking them from the highest race/sex-specific diabetes-related mortality risk in 1980 to the third highest by 1987. The age-adjusted rate for nonwhite females with diabetes rose nearly 16 percent from 1980 so that by 1987 nonwhite female diabetics exhibited the second highest risk of a diabetes-related death. The diabetes-related mortality rate for white female diabetics was the lowest of the race/sex-specific rates each year from 1980 to 1987.

Overall, age-adjusted diabetes mortality within the diabetic population remained essentially unchanged over the 1980-1987 period. This may suggest that the increase in diabetes mortality in the general population is due to increases in prevalence or diagnosis rather than to increased risk that diabetics will die from their disease.

High crude diabetes-related mortality rates for 1980 through 1989 were particularly evident in northeastern North Carolina, with most of the high rates occurring in counties within DEHNR Regions IV and VI. Overall rates were higher all along the eastern part of the state after age-adjusting, with additional pockets of high rates scattered throughout the west. For both crude and age-adjusted rates by race, highly significant clustering ( $p \leq .01$ ) was found in many of the northeastern counties for whites and in some western counties for nonwhites.

Differences were found between diagnoses mentioned on the death certificates of all decedents and diagnoses mentioned in conjunction with diabetes. Persons with diabetes suffer daily from the afflictions imposed by chronic heart, circulatory, and kidney diseases. Diabetics with a mention of diabetes on their death certificate also died more frequently from these diseases.



## PREFACE

The North Carolina Department of Health, Environment, and Natural Resources' (DEHNR) State Center for Health and Environmental Statistics (SCHES) has been awarded a three-year grant from the Centers for Disease Control (CDC) to design and implement a statewide surveillance system for diabetes. Public health surveillance is defined as "the ongoing and systematic collection and analysis [of population-based datasets]" (1). Surveillance will enable the identification of groups at high risk for diabetes, the appropriate targeting of interventions, and the more accurate measurement of progress in disease prevention and control. The grant will also allow for the dissemination of surveillance results to a wider audience.

While diabetes data are found in several population-based datasets, they are not always analyzed consistently or completely. This grant will allow the SCHES to improve its use of data and systems currently available so that diabetes morbidity and mortality can be better understood.

This mortality report represents the first in a series of diabetes surveillance studies. The results of the following activities will also be detailed in upcoming studies: a statewide telephone survey focusing on diabetes, an analysis of diabetes-related hospitalization, and a description of the blind population afflicted with diabetic eye disease.

## INTRODUCTION

In 1989, diabetes mellitus ranked seventh among the leading causes of mortality in North Carolina (Table 1). It was also the state's eighth leading cause of "years of potential life lost," accounting for 176 years of life lost per 100,000 population (Table 2). Based on any mentioned conditions, North Carolina had the 19th highest crude diabetes mortality rate in the United States for the period 1980 through 1986; and after adjustments for age and race, that ranking rose to 16th (Table 3) (1).

Mortality statistics typically underestimate the relationship of diabetes to mortality. They tend to rely exclusively on the underlying cause of death as cited on the death certificate and therefore to identify only those who die from acute symptoms (e.g., those with ketoacidosis or severe vascular problems).

Generally, diabetics do not die from acute symptoms of diabetes. Far more common is a scenario in which the patient suffers from chronic complications that increase the risk of life-threatening heart, kidney, and vascular diseases (2). Should one of these diseases prove fatal, all mention of the diabetes which brought it on may be obscured. Instead, the underlying cause of death is often listed as atherosclerosis, acute myocardial infarction, stroke, nephritis, nephrosis, and so on. Underreporting of this sort is probably most common on the death certificates of geriatric patients suffering from multiple chronic conditions (3).

Given the insidious nature of the disease, establishing accurate mortality statistics can be difficult. One improvement that can be made is to tabulate both the underlying cause of death and the mentioned (i.e., contributory) causes listed on the death certificate. Modifying the evaluative protocol in this fashion allows one to assess the extent to which diabetes serves as a forerunner to various other fatal diseases. Indeed, the data indicate that, throughout the 1980s, diabetes was reported 4.3 times as often as a contributory cause of death than as an underlying cause. Studies that ignore this contributory relationship cannot hope to convey an accurate sense of the disease's impact.

Even with this modification, however, this study's estimates of diabetes-related mortality are probably too low. Several studies have shown that diabetes is listed (anywhere) on the death certificate for only 40 percent of the known diabetics (1); other studies estimate that 40 percent of all diabetics are never even diagnosed (2), while still others conclude that the true diabetes mortality rate is ten times higher than the rate revealed by data on the underlying cause of death (3,4). Nevertheless, trends in adjusted mortality rates are probably reliable indicators of changes in population structure, disease prevalence, and/or disease management, so long as reporting remains consistent over time.

Readers should be aware that an otherwise unexplained increase in diabetes-related mortality could result from an improved awareness of a reporting problem. However, analyses using underlying cause of death data yield very similar results to those obtained using mentioned cause. These results would seem to indicate that corrections based on such an awareness have not yet taken place in North Carolina.



## METHODS

Death certificates registered by the Vital Records Section within the North Carolina Department of Environment, Health, and Natural Resources' Division of Epidemiology were used to enumerate North Carolina resident deaths from 1980 through 1989. Diabetes may be indicated as an underlying cause of death and/or as any one of up to 20 mentioned causes of death. The terms *mentioned* and *diabetes-related* may be used synonymously when referring to causes of death.

Deaths are not double-counted. For example, a death certificate showing both "diabetes with renal manifestations" and "diabetes with peripheral circulatory disorders" as mentioned causes of death is counted as only one diabetes-related death.

The North Carolina Office of State Budget and Management supplied the North Carolina resident July 1 population estimates for the years 1980 through 1989. Estimates of the black population were not available for intercensal years; therefore, crude mortality rates were calculated for the nonwhite population as a whole. Age-adjusted mortality rates in the general population were calculated using the direct method (5) and the 1980 age-specific population of the United States as the standard (1).

Synthetic estimates of the North Carolina diabetic population were derived for the years 1980 through 1987 as described on page 4. Age-adjusted mortality rates in the diabetic population were calculated using the direct method (5) and the 1980 age-specific population of the United States as the standard (1).

The diabetes-related crude and age-adjusted mortality rates in the general population were mapped by county. In the first two pages of maps (Figures 7 and 8), the rates were divided into five levels, from highest (depicted in solid black) to lowest (solid white). To assign the ranges for these levels, a Statistical Analysis System (SAS) clustering routine (6) was used to group counties "most like each other" with respect to their crude and age-adjusted rates. Depending upon the degree and direction with which county rates differ from one another, the results may yield widely varying numbers of counties per level.

The second set of maps (Figures 9 and 10) use an analysis of the spatial or geographic clustering of

counties with high crude and adjusted diabetes-related mortality rates to determine statistical significance. While some high-rate counties might be adjacent to one another by chance, a relatively large number of adjacencies will have a low probability of random occurrence (7). In this report, high-rate counties are said to cluster geographically if the probability of this being a random occurrence is .05 or less.

Although the period mapped was the entirety of the 1980s, there were several cases in which the number of diabetes-related deaths per county was very small, or even zero. Hence, some of the extreme rates, particularly for nonwhites, must be viewed with caution.

## RESULTS: DIABETES MORTALITY IN THE GENERAL RESIDENT POPULATION

### *Number of Deaths*

Diabetes was mentioned on the death certificates of 3,598 North Carolina residents in 1980 (Figure 1 and Table 4). Over the decade, the annual number of these deaths increased each year, rising nearly 39 percent to a high of 4,992 in 1989. The 10-year period saw a total of 41,676 diabetes-related deaths. Diabetes as an underlying cause of death increased similarly: in 1980 it claimed 866 lives; by 1989 that figure had risen 58 percent to 1,372 (Figure 1 and Table 5).

Of nine age groups, those aged 65-74 had the most diabetes-related deaths from 1980 through 1989 (13,370), with the fewest (only 12) dying at ages 0-14 (Table 4). More white females (15,515) died from diabetes or a diabetes-related complication than any other race/sex group (Table 6). Nonwhite males accounted for the fewest deaths (4,669).

### *Mortality Rates: Overall*

From 1980 through 1989, the annual crude diabetes-related death rate increased 24 percent in North Carolina, from 61.2 to 76.0 deaths per 100,000 population (Table 4 and Figure 2). The largest single-year rise was in 1987, when the crude rate jumped nearly nine percent from 68.0 to 74.0. After adjustments for age, however, North Carolina's annual diabetes-related mortality rate increased only six percent between 1980 and 1989.



The crude diabetes-related mortality rate was higher for North Carolina than for the United States each year from 1980 through 1986. This disparity widened over three-fold, with the crude North Carolina diabetes-related rate 2.3 percent higher than that of the nation in 1980 compared to 8.5 percent higher by 1986. The North Carolina age-adjusted diabetes-related mortality rate averaged 12 percent higher than the United States rate from 1980 through 1986.

Using the underlying cause of death, North Carolina's crude and age-adjusted diabetes death rates tended to track national figures far more closely than did rates using the mentioned cause of death. This phenomena may indicate some state-to-state variation in the reporting of mentioned conditions.

### ***Mortality Rates: Race/Sex Groups***

The age-adjusted diabetes-related rate for nonwhite females was consistently the highest of the race/sex-specific rates from 1980 through 1989 (Table 7 and Figure 3). Nonwhite males ranked second highest, with white males ranking third, and white females displaying the lowest rates over the period. The rate for nonwhite males increased most rapidly, up 31 percent from 1980 to 1989. The age-adjusted rate for nonwhite females increased 14 percent over the period. The white female rate was nearly unchanged, while the white male rate rose a relatively modest six percent from 1980 to 1989.

For nonwhite males and nonwhite females, the North Carolina age-adjusted diabetes-related mortality rates were far higher than those for the United States (22 and 11 percent above, respectively) from 1980 through 1986 (Figure 4). The rate for white males was also higher than the United States rate for each years 1980 through 1986, ending nearly seven percent higher. However, the North Carolina white female rate closely followed the United States rate throughout 1980 through 1986.

## **RESULTS: DIABETES MORTALITY IN THE DIABETIC POPULATION**

Using results from the annual Health Interview Surveys from 1980 through 1987, the Centers for Disease Control published national and regional estimates of diabetes prevalence rates. The SCHES derived estimates of the number of diabetics in North Carolina by applying age/race/sex-specific prevalence rates reported for the Southern region (Table 8) to the corresponding North Carolina

age/race/sex-specific population estimates (results in Table 9).

Mortality rates for the estimated North Carolina diabetic population were then calculated (Table 10), using the 1980 age-specific population of the United States as the standard for age adjustments. Such calculations may be used to determine if the diabetic's risk of dying from diabetes has changed over time and/or if the risk varies among race/sex groups. Also of interest is the question of how the overall pattern of diabetes mortality among diagnosed diabetics differs from that observed in the general population. The reader should keep in mind, however, that the population bases for diabetics are synthetic estimates that may not be truly representative of North Carolina.

Overall age-adjusted diabetes-related mortality rates remained essentially unchanged for the diabetic population from 1980 through 1987 (Table 10). This trend is in contrast to the slight increase (6 percent) in the overall age-adjusted diabetes-related mortality rate found in the general population for the same period.

The rank order of age-adjusted race/sex-specific mortality rates in the diabetic population (Figure 5) is different from that observed in the general population. Age-adjusted mortality rates for diabetic nonwhite males were the highest and the most rapidly increasing of the race/sex-specific rates during the period 1980 through 1987. On the other hand, age-adjusted rates for nonwhite males were the second highest of the race/sex-specific rates in the general population.

In 1980 white males experienced the highest of the race/sex-specific age-adjusted mortality rates in the diabetic population, but by 1987 that rate had declined 24 percent to become the third highest of the race/sex-specific rates. Rates for white males were also the third highest in the general population.

The age-adjusted mortality rate for nonwhite female diabetics declined between 1980 and 1983, but increased thereafter to rank second of the race/sex-specific rates by 1987. In contrast, the rate for nonwhite females was the highest of the race/sex groups in the general population.

The age-adjusted mortality rate for white females was generally the lowest of the race/sex-specific rates in the diabetic population from 1980 through 1987, although it increased nearly 16 percent during the period. White females also had the lowest of the race/sex-specific rates in the general population.



CDC estimated national diabetes-related mortality rates in the diabetic population from 1980 through 1986 (1). Comparisons were then made to North Carolina rates by age-adjusting to a common standard—the United States 1980 diabetic population (Table 11 and Figure 6). After this adjustment, all but one of North Carolina's race/sex-specific rates were found to be consistently and significantly higher than comparable US figures. Only the state rate for white females was lower than the nation, and in fact, closely tracked national marks throughout the period.

Among the diabetic population, the age-adjusted diabetes-related mortality rate of white males was the highest of the race/sex-specific rates in 1980, and about six percent higher than for the US. Although the rate fell substantially for both NC and the US from 1980 to 1986 (19 and 17 percent respectively), white male diabetics ranked second in diabetes-related mortality risk. The rate for nonwhite males increased nearly 3 percent, however, taking them from the second-highest ranking mortality risk to the first. Moreover, the rate for nonwhite males with diabetes in North Carolina began 13 percent higher than the United States benchmark, and ended 21 percent higher.

The North Carolina age-adjusted race/sex-specific diabetes-related mortality rate for nonwhite female diabetics remained third ranked from 1980 to 1986. It decreased 17 percent and ended 11 percent higher than the United States reference point.

## GEOGRAPHIC PATTERNS

High crude diabetes-related mortality rates for 1980 through 1989 were particularly evident in the northeast, with most of the high rates occurring in counties within DEHNR Regions IV and VI (Figure 8 and Appendix). Age-adjusting (using the 1980 North Carolina population as the standard) emphasized the regional nature of the problem (Figure 9). Overall rates were higher along the eastern part of the state after age adjustment, with additional pockets of high rates scattered throughout the west.

The spatial clustering of rates followed a very similar and highly significant ( $p \leq .01$ ) pattern: both crude and age-adjusted diabetes-related mortality rates (Figures 10 and 11 respectively) were very high in the northeast and, to a lesser extent, in the west.

Examining county-level crude and age-adjusted rates by race, highly significant clustering ( $p \leq .01$ ) was found among northeast counties for whites and western counties for nonwhites. Again, some of the mortality rates for nonwhites are based on very small number of deaths, and consequently, extreme rates should be interpreted with caution.

## OTHER MENTIONED CONDITIONS

Several of the major chronic diseases are mentioned more frequently in the presence of diabetes than in total (Figure 11). For example, of 4,992 diabetes-related deaths in 1989, 51 percent of the death certificates also mentioned heart disease as a cause of death. For all resident deaths, heart disease was a mentioned cause only 38 percent of the time.

Atherosclerosis was the second most frequently mentioned cause of death paired with diabetes on the death certificate. One-third of the death certificates mentioning diabetes also mentioned atherosclerosis. Among all decedents, 20 percent of death certificates mentioned atherosclerosis.

Hypertension, with or without renal disease, was mentioned nearly three times as often on death certificates also mentioning diabetes (24 percent compared to 9 percent of all deaths).

Kidney disease was mentioned twice as often among diabetes-related deaths (10 percent) as among all deaths (5 percent).

Cancer, on the other hand, was mentioned half as often for diabetes-related deaths (12 percent) as for all deaths (25 percent).

## DISCUSSION

Death certificate data for 1980 through 1989 indicate an increase in (1) the number of deaths attributable to diabetes and (2) the crude and age-adjusted mortality rates in the general population. Numbers, rates, and temporal trends varied by race and sex.

Crude and age-adjusted diabetes-related mortality rates among the general population were significantly higher for nonwhite females than for any other race/sex group. Rates for nonwhite males were the second highest, but increased more than rates for other race/sex groups during the 1980s.



In contrast, mortality rates within the diabetic population revealed that nonwhite male diabetics had the greatest risk of dying from a diabetes-related cause. That risk increased 16 percent from 1980 through 1987. Rates for white male diabetics declined 24 percent, taking them from the highest race/sex-specific mortality risk in 1980 to the third highest by 1987. Mortality rates for white and nonwhite female diabetics were generally the lowest of the race/sex-specific rates.

Recent increases in diabetes mortality among the general population of North Carolina, particularly nonwhites, are troubling. As discussed earlier, under-reporting problems can make mortality-related data on diabetes difficult to interpret. However, if the higher rates in the latter part of the decade were due to better reporting because of an increased awareness of the contributory role diabetes plays in mortality, one would expect this to be seen in all groups, not just nonwhites. That analyses using underlying cause of death data yield very similar results to those using mentioned cause also suggest that reporting improvements have not yet begun to take place in North Carolina.

Overall, diabetes mortality rates within the diabetic population remained essentially unchanged during the 1980s. This may suggest that the increase in diabetes mortality rates in the general population is due to increased prevalence of the disease rather than to increased risks that diabetics will die from their disease (at least from 1980 through 1987).

Comparing diabetes-related deaths to all deaths, there is a strikingly different pattern of diagnoses mentioned on the death certificate. Diabetics suffer daily from afflictions imposed by chronic heart, circulatory, and kidney diseases. Those with a mention of diabetes on their death certificate also die from these diseases more frequently than do all residents.

While this analysis has offered some insights concerning the patterns and distribution of diabetes mortality, conclusions regarding quality of care and the relationship between disease management and mortality risks must await the analysis of information from sources other than death certificates.

## REFERENCES

1. Centers For Disease Control, Division of Diabetes Translation, *Diabetes Surveillance*, 1980-87, (Atlanta: U.S. Department of Health and Human Services, [April 1990]), 1, 9-12, 43-47, 50-53, 56-71.
2. Julio V. Santiago, "Overview of the Complications of Diabetes," *Clinical Chemistry* Vol. 32 (October 1986): B48-B50.
3. Carter Center of Emory University, "Closing the Gap: The Problem of Diabetes Mellitus in the United States," *Diabetes Care* Vol. 8 (July-August 1985): 393.
4. Centers For Disease Control, "Deaths from Diabetes — United States, 1986," *Morbidity and Mortality Weekly Report*, Vol. 38 (August 11, 1989): 543.
5. North Carolina Department of Human Resources, State Center for Health Statistics, "Adjusted Rates," *Statistical Primer*, Vol. 1, No. 1: 2-4.
6. SAS Institute Inc., *SAS/STAT User's Guide*, Release 6.03 Edition, (Cary, NC 1988): 283-357.
7. R.C. Grimson, K.C. Wank, and P.W.C. Johnson, "Searching for Hierarchical Clusters of Diseases: Spatial Patterns of Sudden Infant Death Syndrome," *Social Science Medicine*, Vol. 15D (1981): 287-293.
8. Calvin Pierce, "Advancing the Frontiers of Diabetes Research and Treatment," *National Center for Research Resources Reporter*, Vol. XV (April 1991): 5.



## LIST OF TABLES AND FIGURES

	Page
Table 1 — Leading Causes of Mortality Ranked by Rate per 100,000 Population, North Carolina 1989 (Based on Underlying Cause of Death) .....	8
Table 2 — Leading Causes of Mortality Ranked by Years of Life Lost per 100,000 Population, North Carolina 1989 (Based on Underlying Cause of Death) .....	8
Table 3 — Average Mortality Rate for Diabetes as Any Listed Cause per 100,000 Population, by State and Rank, United States, 1980-86 .....	9
Table 4 — Numbers of Deaths with Diabetes as Mentioned Cause of Death and Mortality Rates per 100,000 Population, by Age Group and Year, North Carolina, 1980-89 and United States, 1980-86 ....	10
Table 5 — Numbers of Deaths with Diabetes as Underlying Cause of Death and Mortality Rates per 100,000 Population, by Age Group and Year, North Carolina, 1980-89 and United States, 1980-86 ....	11
Table 6 — Number of Deaths with Diabetes as a Mentioned Cause of Death by Race/Sex Group and Year, North Carolina 1980-89 .....	12
Table 7 — Age-Adjusted Diabetes Mortality Rates Using Mentioned Cause of Death, by Race, Sex, and Race/Sex by Year, North Carolina, 1980-89 .....	12
Table 8 — Estimated Age/Race/Sex-Specific Diabetes Prevalence Rates per 1,000 Population, by Year, Southern Region, United States, 1980-87 .....	13
Table 9 — Estimated Age/Race/Sex-Specific Diabetes Prevalence, North Carolina, 1980-87 .....	14
Table 10 — Race/Sex-Specific Diabetes-Related Mortality Rates Per 100,000 Diabetes Population, North Carolina, 1980-87 .....	15
Table 11 — Age-Adjusted Race/Sex-Specific Diabetes-Related Mortality Rates per 100,000 Diabetic Population, North Carolina and United States, 1980-86 .....	16
Figure 1 — Numbers of Deaths with Diabetes Coded as Underlying and as Mentioned Cause of Death, by Year, North Carolina Residents, 1980-89 .....	17
Figure 2 — Overall Crude and Age-Adjusted Diabetes Mortality Rates Using Underlying and Mentioned Cause of Death, by Year, North Carolina, 1980-89 and United States, 1980-86 .....	17
Figure 3 — Age-Adjusted Race/Sex-Specific Diabetes Mortality Rates by Year, Using Mentioned Cause of Death, North Carolina Residents, 1980-89 .....	18
Figure 4 — Age-Adjusted Race/Sex-Specific Diabetes Mortality Rates by Year, Using Mentioned Cause of Death, North Carolina, 1980-89 and United States, 1980-86 .....	18
Figure 5 — Age-Adjusted Race/Sex-Specific Diabetes Mortality Rates by Year, Using Mentioned Cause of Death, Estimated North Carolina Diabetic Population, 1980-87 .....	19
Figure 6 — Age-Adjusted Race/Sex-Specific Diabetes-Related Mortality Rates per Diabetic Population by Year, North Carolina and United States, 1980-86 .....	19
Figure 7 — Diabetes Mentions (Crude) .....	20
Figure 8 — Diabetes Mentions (Age-Adjusted) .....	21
Figure 9 — Spatial Clustering of Diabetes Mentions (Crude) .....	22
Figure 10 — Spatial Clustering of Diabetes Mentions (Age-Adjusted) .....	23
Figure 11 — Percent of Deaths with Selected Mentioned Conditions: Comparisons of Diabetes-Related and Total Deaths, North Carolina Residents, 1989 .....	24



**Table 1**  
**Leading Causes of Mortality Ranked by Rate**  
**per 100,000 Population**  
**North Carolina 1989**  
**(Based on Underlying Cause of Death)**

Heart Disease .....	288.6
Cancer .....	197.4
Cerebrovascular Disease .....	70.2
Unintentional Injuries .....	48.4
Chronic Lung Disease .....	29.4
Pneumonia and Influenza .....	28.9
Diabetes Mellitus .....	20.9
Suicide .....	13.3
Chronic Liver Disease .....	11.6
Homicide .....	10.7
Kidney Disease .....	8.1
Septicemia .....	8.0
Atherosclerosis .....	5.6

**Table 2**  
**Leading Causes of Mortality**  
**Ranked by Years of Life Lost per 100,000 Population\***  
**North Carolina 1989**  
**(Based on Underlying Cause of Death)**

Cancer .....	1,790
Heart Disease .....	1,574
Unintentional Injuries .....	1,441
Suicide .....	388
Homicide .....	379
Cerebrovascular Disease .....	280
Chronic Liver Disease .....	184
Diabetes Mellitus .....	176
Chronic Lung Disease .....	169
Pneumonia and Influenza .....	137
Septicemia .....	60
Kidney Disease .....	51
Atherosclerosis .....	12

\*Average years of life lost by all decedents. The following projected 1990 life expectancies for North Carolina were used to calculate average years of life lost: 72 for white males, 80 for white females, 67 for nonwhite males, and 76 for nonwhite females. (Source: N.C. Office of State Budget and Management.)



**Table 3**  
**Average Mortality Rate for Diabetes as Any Listed Cause**  
**per 100,000 Population, by State and Rank,**  
**United States, 1980-1986**

State	Rate	Rank	Adjusted Rate*	Rank
Alabama	49.1	38	44.0	46
Alaska	12.7	51	46.3	41
Arizona	39.7	43	41.2	50
Arkansas	45.7	41	37.3	51
California	52.4	33	58.4	20
Colorado	35.4	47	45.7	44
Connecticut	76.5	5	70.6	6
Delaware	63.5	18	64.3	13
Dist. of Columbia	70.9	10	42.2	49
Florida	64.8	17	46.0	42
Georgia	47.2	40	50.5	33
Hawaii	49.7	37	49.9	36
Idaho	39.3	45	54.3	26
Illinois	67.7	13	65.7	9
Indiana	65.4	16	65.7	10
Iowa	62.7	20	55.4	24
Kansas	56.0	28	50.3	34
Kentucky	56.6	27	56.1	22
Louisiana	54.6	30	57.0	21
Maine	72.3	7	61.7	17
Maryland	55.9	29	59.2	19
Massachusetts	71.5	9	63.3	15
Michigan	68.1	11	70.7	5
Minnesota	60.8	23	59.7	18
Mississippi	59.1	24	53.0	30
Missouri	61.5	21	52.3	31
Montana	42.8	42	43.2	48
Nebraska	58.0	25	51.8	32
Nevada	35.1	48	45.5	45
New Hampshire	66.5	14	64.6	12
New Jersey	79.8	3	73.7	4
New Mexico	34.7	49	44.0	47
New York	71.7	8	64.0	14
North Carolina	63.3	19	61.7	16
North Dakota	58.0	26	48.1	38
Ohio	78.3	4	76.1	2
Oklahoma	52.8	32	50.3	35
Oregon	50.2	35	53.1	29
Pennsylvania	89.0	1	75.0	3
Rhode Island	88.6	2	76.7	1
South Carolina	53.1	31	55.0	25
South Dakota	60.9	22	49.8	37
Tennessee	50.3	34	47.3	39
Texas	39.7	44	45.8	43
Utah	36.2	46	55.6	23
Vermont	65.9	15	66.3	8
Virginia	50.2	36	53.6	28
Washington	47.8	39	54.1	27
West Virginia	73.0	6	68.8	7
Wisconsin	67.9	12	65.0	11
Wyoming	30.2	50	46.6	40

\*Adjusted for age and race.



**Table 4**  
**Numbers of Deaths with Diabetes as Mentioned Cause of Death**  
**and Mortality Rates per 100,000 Population, by Age Group and Year**  
**North Carolina, 1980-89 and United States, 1980-86**

Age Group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1980-89
<b>0-14</b>											
Number NC	0	1	1	2	2	2	3	0	0	1	12
Rate NC	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.0	0.0	0.1	0.1
Rate US	0.1	0.1	0.2	0.2	0.1	0.1	0.1	—	—	—	—
<b>15-24</b>											
Number NC	6	4	6	6	5	6	3	4	9	5	4
Rate NC	0.5	0.4	0.5	0.5	0.4	0.5	0.3	0.4	0.8	0.5	0.5
Rate US	0.5	0.6	0.4	0.5	0.5	0.5	0.6	—	—	—	—
<b>25-34</b>											
Number NC	36	23	36	46	35	25	26	42	37	54	360
Rate NC	3.7	2.3	3.6	4.5	3.4	2.4	2.4	3.9	3.4	4.8	3.4
Rate US	2.5	2.3	2.5	2.4	2.4	2.3	2.6	—	—	—	—
<b>35-44</b>											
Number NC	63	75	68	78	91	86	93	87	115	112	868
Rate NC	9.2	10.4	9.1	10.1	11.3	10.2	10.7	9.7	12.4	11.7	10.5
Rate US	7.9	7.8	7.3	7.8	7.9	8.0	8.1	—	—	—	—
<b>45-54</b>											
Number NC	255	241	251	217	224	244	255	299	282	305	2,573
Rate NC	42.4	39.9	41.4	35.6	36.5	39.2	40.0	45.6	41.9	44.3	40.8
Rate US	30.6	30.9	29.9	30.3	29.6	29.8	30.3	—	—	—	—
<b>55-64</b>											
Number NC	706	716	684	745	724	740	758	800	778	815	7,466
Rate NC	128.2	128.1	121.0	130.3	124.7	125.8	128.5	135.0	130.7	136.4	128.9
Rate US	100.5	99.9	98.4	101.3	100.3	102.1	102.6	—	—	—	—
<b>65-74</b>											
Number NC	1,181	1,215	1,211	1,197	1,331	1,308	1,357	1,522	1,499	1,549	13,370
Rate NC	304.9	306.6	300.1	291.7	317.4	304.5	306.7	333.6	318.9	320.5	311.0
Rate US	261.9	256.8	252.5	256.9	257.1	259.0	255.1	—	—	—	—
<b>75-84</b>											
Number NC	992	968	1,015	1,049	1,163	1,226	1,289	1,433	1,510	1,497	12,142
Rate NC	582.6	535.6	536.9	532.0	563.7	569.2	576.1	616.4	625.8	599.4	576.5
Rate US	551.8	535.2	529.6	542.2	539.3	538.8	532.2	—	—	—	—
<b>85+</b>											
Number NC	359	368	407	420	392	493	518	556	664	654	4,831
Rate NC	794.8	746.8	774.8	753.5	661.9	789.7	801.8	831.4	960.2	916.5	810.1
Rate US	877.9	860.6	848.0	860.8	854.0	864.9	862.6	—	—	—	—
<b>Total</b>											
Number NC	3,598	3,611	3,679	3,760	3,967	4,130	4,302	4,743	4,894	4,992	41,676
Rate NC	61.2	60.6	61.2	61.9	64.3	66.0	68.0	74.0	75.4	76.0	67.1
Rate US	59.8	59.2	59.0	60.9	61.1	62.1	62.7	—	—	—	—
<b>Adjusted</b>											
Rate NC	67.9	65.5	64.9	64.6	66.0	66.7	67.6	72.4	72.6	72.2	—
Adjusted											
Rate US	59.8	58.7	57.8	59.0	58.7	59.1	58.7	—	—	—	—



**Table 5**  
**Numbers of Deaths with Diabetes as Underlying Cause of Death**  
**and Mortality Rates per 100,000 Population, by Age Group and Year**  
**North Carolina, 1980-89 and United States, 1980-86**

Age Group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1980-89
<b>0-14</b>											
Number NC	0	0	1	2	2	1	3	0	0	1	10
Rate NC	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.0	0.0	0.1	0.1
Rate US	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—
<b>15-24</b>											
Number NC	3	2	3	3	4	5	1	1	6	3	31
Rate NC	0.3	0.2	0.3	0.3	0.4	0.4	0.1	0.1	0.5	0.3	0.3
Rate US	0.3	0.4	0.3	0.3	0.3	0.3	0.4	—	—	—	—
<b>25-34</b>											
Number NC	21	9	26	24	19	18	18	21	21	35	212
Rate NC	2.2	0.9	2.6	2.4	1.8	1.7	1.7	1.9	1.9	3.1	2.0
Rate US	1.5	1.4	1.4	1.5	1.4	1.3	1.5	—	—	—	—
<b>35-44</b>											
Number NC	18	31	33	33	45	38	44	33	52	48	375
Rate NC	2.6	4.3	4.4	4.3	5.6	4.5	5.1	3.7	5.6	5.0	4.6
Rate US	3.5	3.4	3.4	3.6	3.5	3.7	3.6	—	—	—	—
<b>45-54</b>											
Number NC	70	66	59	53	53	51	65	79	98	99	693
Rate NC	11.6	10.9	9.7	8.7	8.6	8.2	10.2	12.1	14.6	14.4	11.0
Rate US	9.6	9.7	9.1	9.3	8.9	8.8	9.5	—	—	—	—
<b>55-64</b>											
Number NC	184	168	144	185	167	174	156	171	211	232	1,792
Rate NC	33.4	30.1	25.5	32.4	28.8	29.6	26.4	28.9	35.5	38.8	30.9
Rate US	26.6	25.4	25.9	26.5	24.6	25.1	26.0	—	—	—	—
<b>65-74</b>											
Number NC	284	251	236	248	282	231	279	312	370	406	2,899
Rate NC	73.3	63.3	58.5	60.4	67.2	53.8	63.1	68.4	78.7	84.0	67.4
Rate US	64.6	62.0	60.3	61.8	59.3	59.7	59.3	—	—	—	—
<b>75-84</b>											
Number NC	208	194	202	219	219	261	269	289	373	377	2,611
Rate NC	122.2	107.4	106.8	111.1	106.1	121.2	120.2	124.3	154.6	150.9	124.0
Rate US	130.2	130.0	126.7	130.1	126.0	128.0	121.9	—	—	—	—
<b>85+</b>											
Number NC	78	77	83	81	82	90	112	119	195	171	1,088
Rate NC	172.7	156.3	158.0	145.3	138.5	144.2	173.4	177.9	282.0	239.6	182.4
Rate US	219.1	222.3	210.2	210.5	217.6	215.8	213.9	—	—	—	—
<b>Total</b>											
Number NC	866	798	787	848	873	869	947	1,025	1,326	1,372	9,711
Rate NC	14.7	13.4	13.1	14.0	14.2	13.9	15.0	16.0	20.4	20.9	15.6
Rate US	15.3	15.2	15.0	15.5	15.1	15.5	15.5	—	—	—	—
<b>Adjusted</b>											
Rate NC	16.2	14.4	13.8	14.5	14.5	14.0	14.8	15.6	19.6	19.9	—
Adjusted											
Rate US	15.3	15.1	14.7	15.0	14.5	14.7	14.6	—	—	—	—



**Table 6**  
**Number of Deaths with Diabetes as a**  
**Mentioned Cause of Death**  
**By Race/Sex Group and Year**  
**North Carolina, 1980-89**

Year	White Males	White Females	Nonwhite Males	Nonwhite Females	Total
1980	1,199	1,344	386	669	3,598
1981	1,201	1,316	419	675	3,611
1982	1,248	1,390	381	660	3,679
1983	1,261	1,398	409	692	3,760
1984	1,330	1,447	441	749	3,967
1985	1,323	1,606	464	737	4,130
1986	1,362	1,640	504	796	4,302
1987	1,511	1,794	548	890	4,743
1988	1,678	1,768	540	908	4,894
1989	1,637	1,812	577	966	4,992

**Table 7**  
**Age-Adjusted\* Diabetes Mortality Rates Using Mentioned Cause of Death,**  
**By Race, Sex, and Race/Sex by Year**  
**North Carolina, 1980-89**

Year	Total	Whites	Nonwhites	Males	Females	White Males	White Females	Nonwhite Males	Nonwhite Females
1980	67.9	59.8	101.3	73.4	63.6	69.9	52.5	89.0	109.1
1981	65.5	56.9	101.7	71.8	60.4	67.1	49.2	93.2	106.6
1982	64.9	57.8	95.2	71.0	60.4	68.1	50.3	84.6	101.9
1983	64.6	56.5	98.6	70.6	59.7	66.5	48.9	89.1	104.2
1984	66.0	57.1	104.2	73.1	60.9	68.5	49.1	94.4	110.1
1985	66.7	58.3	103.0	71.7	62.5	65.9	52.3	98.2	105.2
1986	67.6	58.0	109.1	73.3	63.1	66.3	51.7	105.4	110.7
1987	72.4	62.0	118.0	78.8	67.3	71.5	54.6	112.7	120.1
1988	72.6	62.6	116.0	83.5	64.6	78.1	51.8	109.1	118.8
1989	72.2	61.0	121.6	81.6	65.5	74.2	51.6	116.5	124.1

\*The 1980 United States resident population is used as the standard for adjustment.



**Table 8**  
**Estimated Age/Race/Sex-Specific Diabetes Prevalence Rates**  
**Per 1,000 Population, By Year**  
**Southern Region, United States, 1980-87**

		1980					1984				
Race/Sex	0-44	45-64	65-74	75+	Total		Race/Sex	0-44	45-64	65-74	75+ Total
White Males	4.7	48.5	97.1	78.8	22.0		White Males	5.1	43.0	89.6	90.5 21.2
White Females	7.3	47.6	93.9	87.2	26.7		White Females	6.5	51.2	95.2	89.2 27.4
Black Males	7.4	98.7	108.1	103.6	28.2		Black Males	5.2	108.3	145.0	111.6 29.1
Black Females	10.6	108.2	132.5	151.2	37.7		Black Females	9.7	115.4	224.0	170.6 44.1
		1981					1985				
Race/Sex	0-44	45-64	65-74	75+	Total		Race/Sex	0-44	45-64	65-74	75+ Total
White Males	5.5	53.8	88.7	68.8	22.7		White Males	5.6	46.1	101.0	95.5 23.2
White Females	6.4	48.6	76.2	97.4	25.6		White Females	7.4	44.8	103.8	87.1 27.4
Black Males	6.4	97.2	116.8	79.3	26.9		Black Males	5.9	110.1	159.2	107.3 30.7
Black Females	9.0	120.8	172.3	144.9	40.6		Black Females	8.1	104.8	216.6	211.6 42.3
		1982					1986				
Race/Sex	0-44	45-64	65-74	75+	Total		Race/Sex	0-44	45-64	65-74	75+ Total
White Males	5.6	51.7	67.6	88.4	21.6		White Males	4.3	65.3	90.9	107.6 25.7
White Females	7.1	48.1	95.6	67.5	25.9		White Females	8.6	52.6	78.2	97.4 28.2
Black Males	6.0	93.2	120.1	83.7	25.8		Black Males	7.6	99.8	143.3	119.5 30.4
Black Females	7.9	135.6	197.9	134.1	43.2		Black Females	7.6	112.0	167.8	219.7 40.9
		1983					1987				
Race/Sex	0-44	45-64	65-74	75+	Total		Race/Sex	0-44	45-64	65-74	75+ Total
White Males	5.9	48.7	64.2	94.0	21.2		White Males	8.2	55.3	100.3	108.5 27.4
White Females	6.0	52.9	75.5	70.8	26.2		White Females	7.4	46.8	84.7	74.7 25.6
Black Males	3.5	104.2	142.7	79.8	26.2		Black Males	6.7	96.3	143.9	113.9 29.1
Black Females	10.5	124.9	243.6	160.1	46.8		Black Females	9.4	109.8	154.9	245.4 42.1



**Table 9**  
**Estimated Age/Race/Sex-Specific Diabetes Prevalence\***  
**North Carolina, 1980-87**

1980					1984						
Race/Sex	0-44	45-64	65-74	75+	Total	Race/Sex	0-44	45-64	65-74	75+	Total
White Males	7,258	21,484	12,598	4,662	47,875	White Males	8,167	19,740	12,753	6,705	48,269
White Females	10,907	23,347	16,908	10,084	60,884	White Females	10,057	26,216	18,686	12,700	65,701
Nonwhite Males	3,962	9,462	3,489	1,545	19,134	Nonwhite Males	2,888	10,488	4,789	1,975	20,455
Nonwhite Females	5,846	13,273	5,995	3,891	28,094	Nonwhite Females	5,643	14,638	10,683	5,354	34,737
Total	27,974	67,567	38,989	20,181	155,986	Total	26,754	71,082	46,912	26,734	169,163
1981					1985						
Race/Sex	0-44	45-64	65-74	75+	Total	Race/Sex	0-44	45-64	65-74	75+	Total
White Males	8,572	24,056	11,825	4,369	49,995	White Males	9,073	21,459	14,769	7,402	53,578
White Females	9,647	24,115	14,071	12,020	59,179	White Females	11,579	23,268	20,898	12,994	66,709
Nonwhite Males	3,458	9,330	3,792	1,247	18,411	Nonwhite Males	3,316	10,748	5,318	1,965	21,838
Nonwhite Females	5,035	14,944	7,906	3,965	30,710	Nonwhite Females	4,786	13,453	10,521	6,941	33,864
Total	26,712	72,446	37,594	21,600	158,294	Total	28,754	68,927	51,506	29,302	175,988
1982					1986						
Race/Sex	0-44	45-64	65-74	75+	Total	Race/Sex	0-44	45-64	65-74	75+	Total
White Males	8,793	23,294	9,206	5,920	48,038	White Males	7,006	30,890	13,737	8,588	59,963
White Females	10,781	24,092	18,005	8,749	60,536	White Females	13,527	27,680	16,227	15,169	69,438
Nonwhite Males	3,265	8,960	3,916	1,368	17,784	Nonwhite Males	4,305	9,865	4,865	2,228	21,824
Nonwhite Females	4,471	16,888	9,183	3,843	33,072	Nonwhite Females	4,542	14,546	8,364	7,506	33,190
Total	27,311	73,233	40,310	19,880	159,430	Total	29,379	82,981	43,193	33,491	184,416
1983					1987						
Race/Sex	0-44	45-64	65-74	75+	Total	Race/Sex	0-44	45-64	65-74	75+	Total
White Males	9,334	22,093	8,917	6,611	47,591	White Males	13,459	26,636	15,677	8,925	64,707
White Females	9,174	26,721	14,481	9,603	58,331	White Females	11,723	25,002	18,137	12,145	63,877
Nonwhite Males	1,921	10,037	4,675	1,357	18,209	Nonwhite Males	3,835	9,660	4,971	2,160	21,133
Nonwhite Females	6,015	15,672	11,440	4,796	36,282	Nonwhite Females	5,697	14,457	7,935	8,729	34,712
Total	26,444	74,523	39,513	22,367	160,413	Total	34,715	75,754	46,720	31,958	184,429

\*Derived from North Carolina population and CDC Southern Region diabetes prevalence rate estimates.



**Table 10**  
**Race/Sex-Specific Diabetes-Related Mortality Rates Per 100,000**  
**Diabetic Population, North Carolina, 1980-87**

1980							1984						
Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted	Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted
White Males	606.2	1,717.5	3,317.9	7,894.3	2,504.5	1,332.9	White Males	526.5	1,752.8	3,693.1	7,009.6	2,755.4	1,271.5
White Females	165.0	1,109.4	2,389.5	6,574.9	2,207.5	786.6	White Females	278.4	946.0	2,381.5	5,716.5	2,202.4	794.5
Nonwhite Males	731.9	1,447.9	3,525.7	6,278.4	2,017.4	1,309.8	Nonwhite Males	1,142.7	1,439.8	3,194.5	5,265.0	2,155.9	1,524.5
Nonwhite Females	239.5	1,476.6	3,936.7	5,731.6	2,381.3	979.3	Nonwhite Females	513.5	1,386.8	2,452.5	4,763.0	2,156.2	1,006.3
Total	375.4	1,422.3	3,029.0	6,694.4	2,306.6	1,042.6	Total	497.1	1,333.7	2,837.3	5,816.5	2,345.1	1,057.4
1981							1985						
Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted	Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted
White Males	443.3	1,500.7	3,644.9	8,491.9	2,402.2	1,226.8	White Males	429.9	1,645.0	3,263.7	6,066.1	2,469.3	1,112.3
White Females	217.7	974.5	2,785.9	5,557.5	2,223.8	778.9	White Females	215.9	1,186.2	2,138.9	6,603.1	2,407.5	820.8
Nonwhite Males	752.0	1,736.3	3,929.2	6,577.9	2,275.8	1,421.2	Nonwhite Males	1,115.9	1,544.4	2,350.3	6,919.7	2,124.7	1,541.5
Nonwhite Females	357.5	1,331.6	3,073.6	5,422.8	2,198.0	959.3	Nonwhite Females	376.1	1,404.9	2,414.2	3,976.2	2,176.4	877.2
Total	385.6	1,321.0	3,231.9	6,185.2	2,281.2	1,021.3	Total	413.9	1,427.6	2,539.5	5,866.4	2,346.7	999.9
1982							1986						
Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted	Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted
White Males	466.3	1,446.7	4,953.3	6,992.9	2,597.9	1,255.9	White Males	670.9	1,207.5	3,152.2	5,926.7	2,271.4	1,179.3
White Females	213.3	1,033.6	2,377.1	7,886.4	2,296.2	862.3	White Females	170.0	946.5	3,007.3	5,715.6	2,361.8	762.8
Nonwhite Males	949.4	1,640.7	2,757.8	6,943.6	2,142.3	1,474.4	Nonwhite Males	813.0	1,611.8	3,515.1	6,239.9	2,309.4	1,395.5
Nonwhite Females	357.5	1,196.1	2,384.8	5,803.5	1,995.7	902.4	Nonwhite Females	440.4	1,505.5	3,168.2	3,890.3	2,398.3	989.4
Total	406.4	1,276.7	3,004.2	7,152.8	2,307.6	1,054.1	Total	425.5	1,220.8	3,141.7	5,395.5	2,332.8	988.1
1983							1987						
Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted	Race/Sex	0-44	45-64	65-74	75+	Crude Total	Age-Adjusted
White Males	460.7	1,738.1	4,710.2	6,262.0	2,649.7	1,260.1	White Males	319.5	1,505.5	3,374.3	6,028.0	2,335.1	1,014.6
White Females	381.5	849.5	2,831.3	7,560.1	2,396.7	959.3	White Females	204.7	1,099.9	2,828.5	8,085.8	2,808.5	909.3
Nonwhite Males	1,821.7	1,504.5	2,588.0	7,518.8	2,246.1	2,064.3	Nonwhite Males	860.5	2,008.3	3,741.6	6,249.7	2,593.2	1,522.0
Nonwhite Females	315.9	1,276.2	2,150.4	4,732.7	1,907.3	825.6	Nonwhite Females	579.3	1,584.1	3,705.2	3,826.5	2,563.9	1,134.9
Total	499.2	1,290.9	3,029.4	6,567.6	2,343.9	1,096.8	Total	383.1	1,450.7	3,257.7	6,223.7	2,571.7	1,048.5



Table 11 Age-Adjusted Race/Sex-Specific Diabetes-Related Mortality Rates* Per 100,000 Diabetic Population North Carolina and United States, 1980-86										
Year	White Males		White Females		Nonwhite Males**		Nonwhite Females**		Total	
	NC	US	NC	US	NC	US	NC	US	NC	US
1980	2,864.5	2,628.8	2,095.2	2,139.4	2,589.1	2,284.5	2,541.7	2,215.6	2,447.4	2,350.3
1981	2,921.5	2,770.6	2,001.6	2,138.3	2,862.5	2,436.1	2,229.2	1,941.6	2,384.9	2,305.9
1982	3,024.4	2,719.6	2,264.4	2,346.8	2,603.7	2,339.5	2,048.7	1,812.0	2,454.4	2,400.1
1983	2,971.0	2,769.0	2,288.7	2,463.6	2,740.7	2,521.2	1,853.3	1,703.4	2,396.0	2,529.6
1984	2,832.1	2,586.0	1,917.6	2,031.6	2,419.4	2,104.6	2,017.6	1,734.3	2,250.9	2,157.9
1985	2,517.2	2,402.4	2,074.1	2,061.4	2,482.1	2,124.0	1,873.8	1,733.4	2,204.2	2,172.9
1986	2,328.4	2,192.6	2,063.5	2,033.8	2,662.4	2,202.1	2,112.2	1,905.7	2,209.2	2,066.1

\*The estimated 1980 United States diabetic population is used as the standard for adjustment.

\*\* Age-Adjusted rates for North Carolina nonwhites are compared to United States blacks.



Figure 1. Numbers of Deaths With Diabetes Coded as Underlying and as Mentioned Cause of Death, by Year  
North Carolina Residents, 1980-89

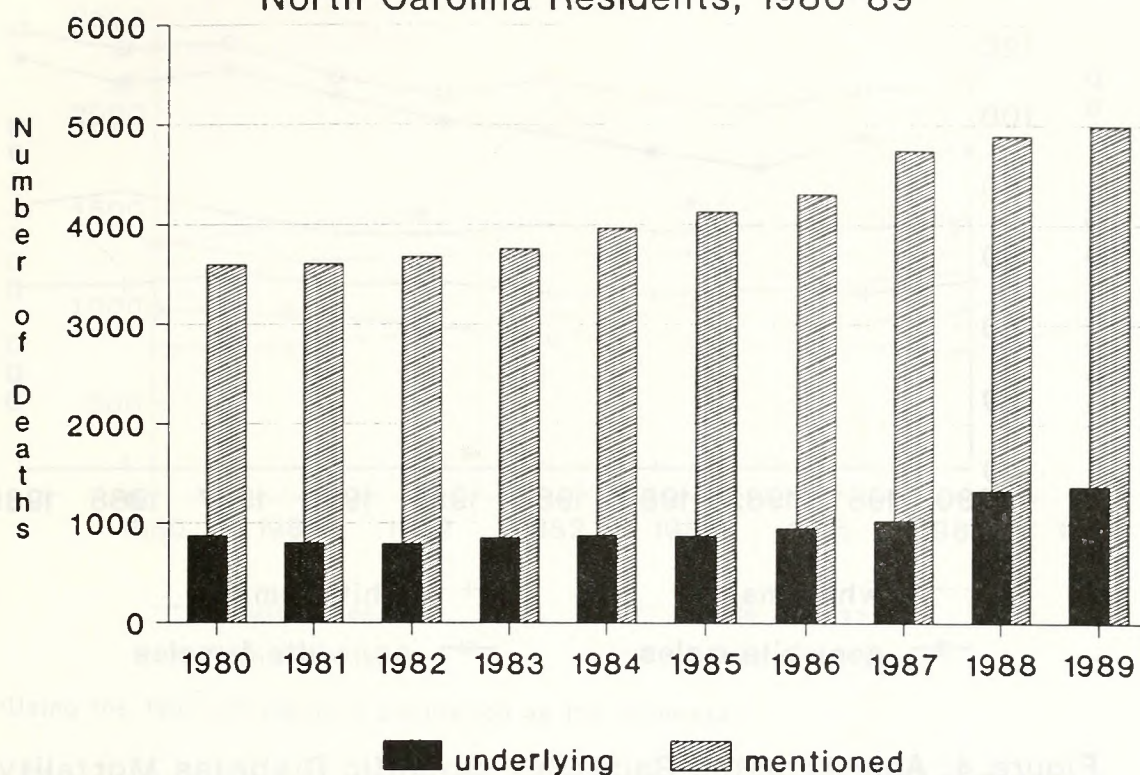


Figure 2. Overall Crude and Age-Adjusted Diabetes Mortality Rates Using Underlying and Mentioned Cause of Death, by Year  
North Carolina, 1980-89 and United States, 1980-86

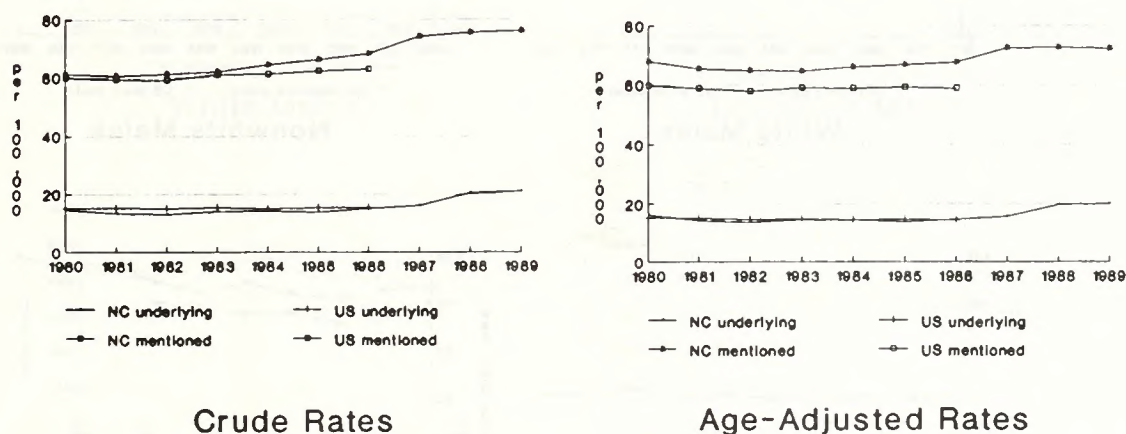




Figure 3. Age-Adjusted Race/Sex-Specific Diabetes Mortality Rates by Year, Using Mentioned Cause of Death  
North Carolina Residents, 1980-89

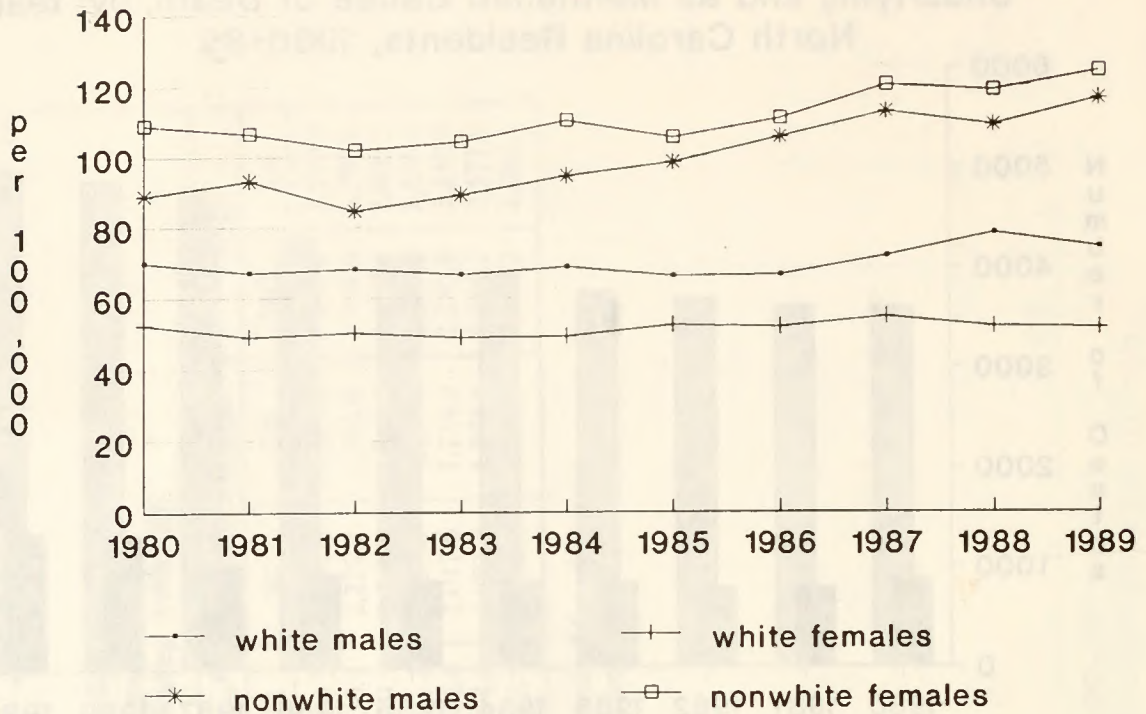


Figure 4. Age-Adjusted Race/Sex-Specific Diabetes Mortality Rates by Year, Using Mentioned Cause of Death  
North Carolina, 1980-89 and United States, 1980-86

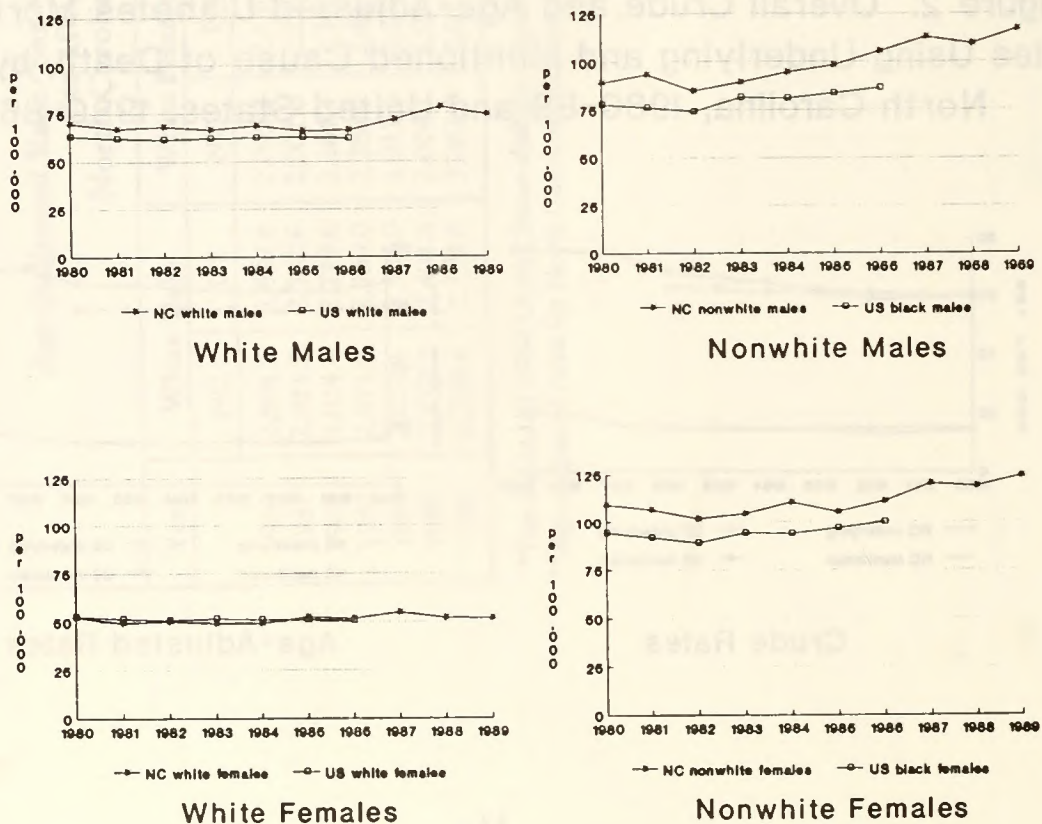
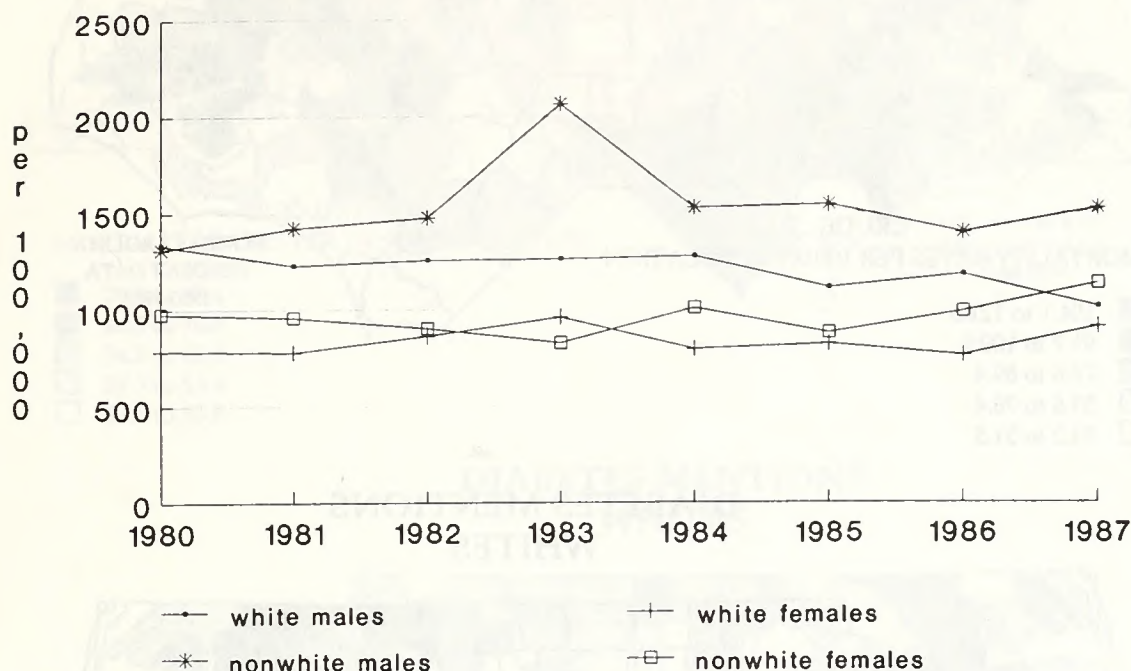


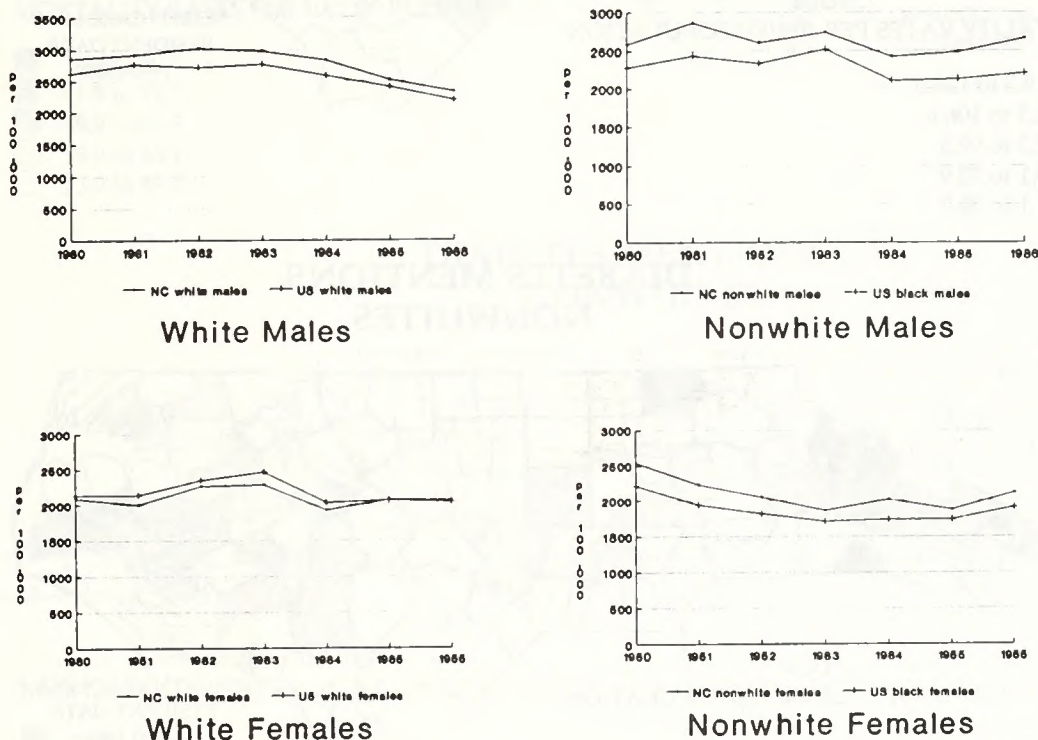


Figure 5. Age-Adjusted\* Race/Sex-Specific Diabetes Mortality Rates by Year, Using Mentioned Cause of Death  
Estimated North Carolina Diabetic Population, 1980-87



\*Using the 1980 US resident population as the standard

Figure 6. Age-Adjusted\* Race/Sex-Specific Diabetes-Related Mortality Rates Per Diabetic Population by Year  
North Carolina and United States, 1980-86

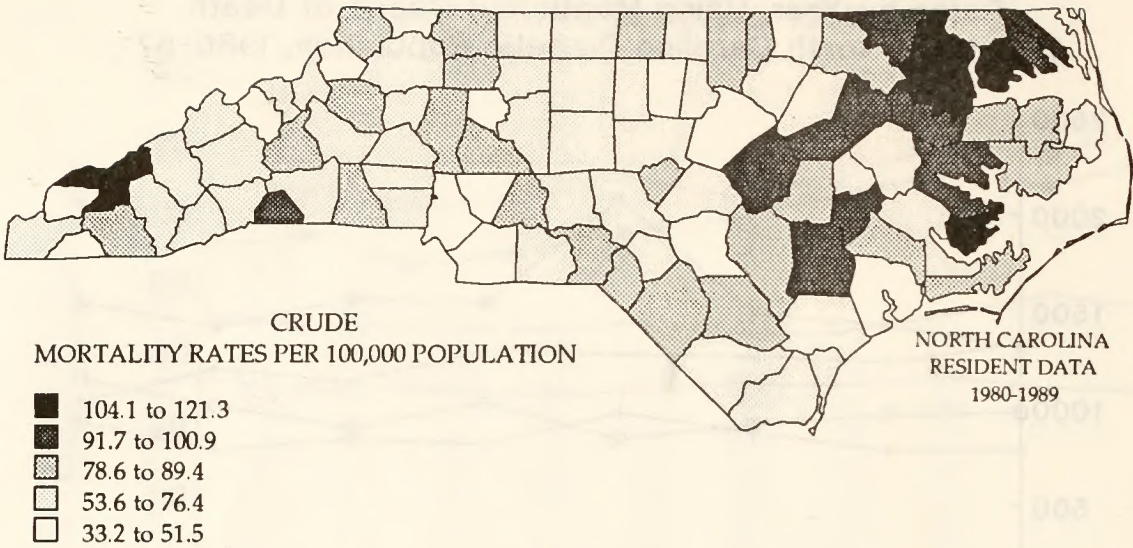


\*Using the estimated 1980 US diabetic population as the standard

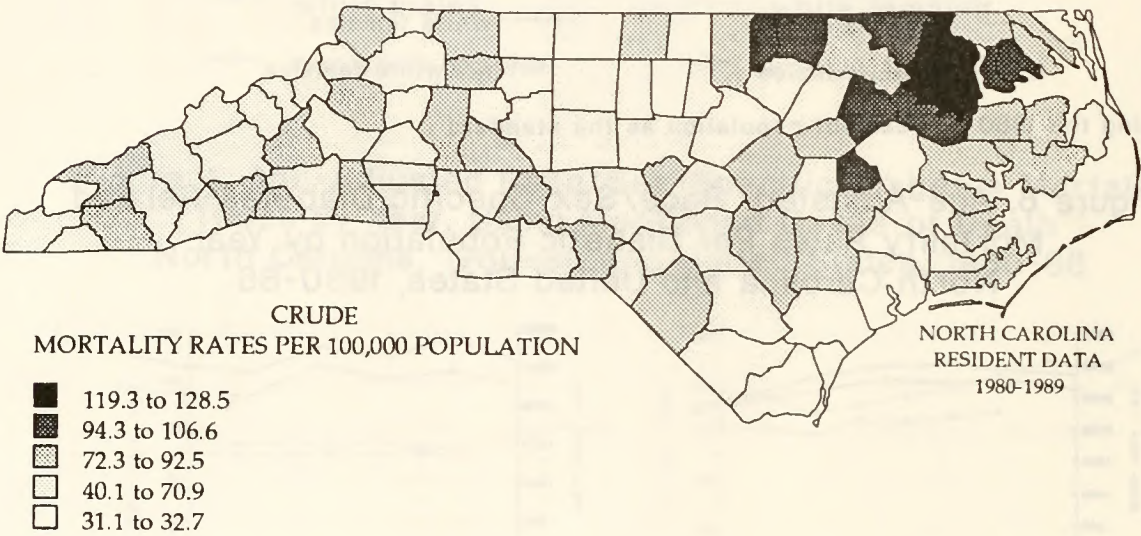


Figure 7.

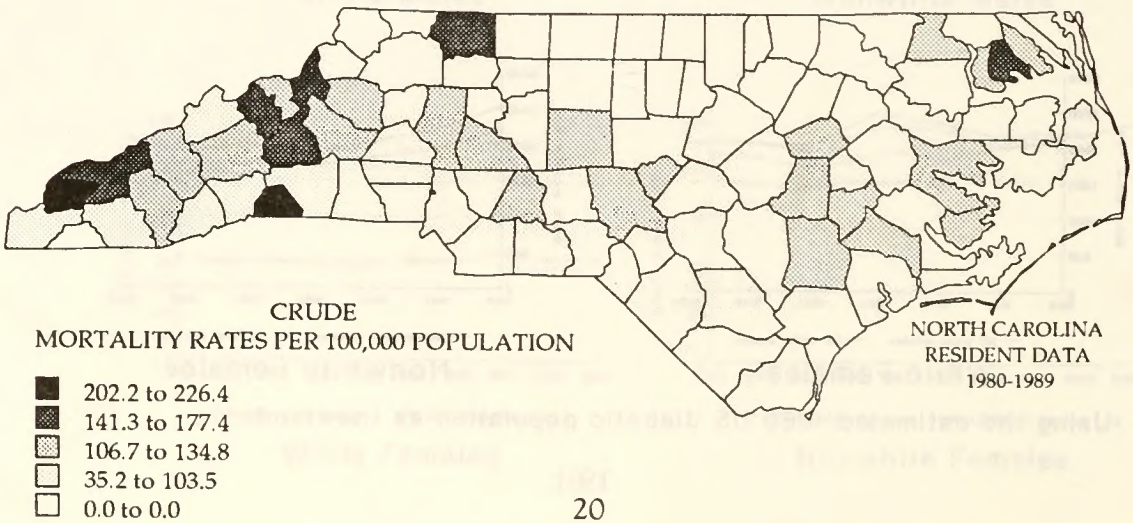
DIABETES MENTIONS



DIABETES MENTIONS  
WHITES



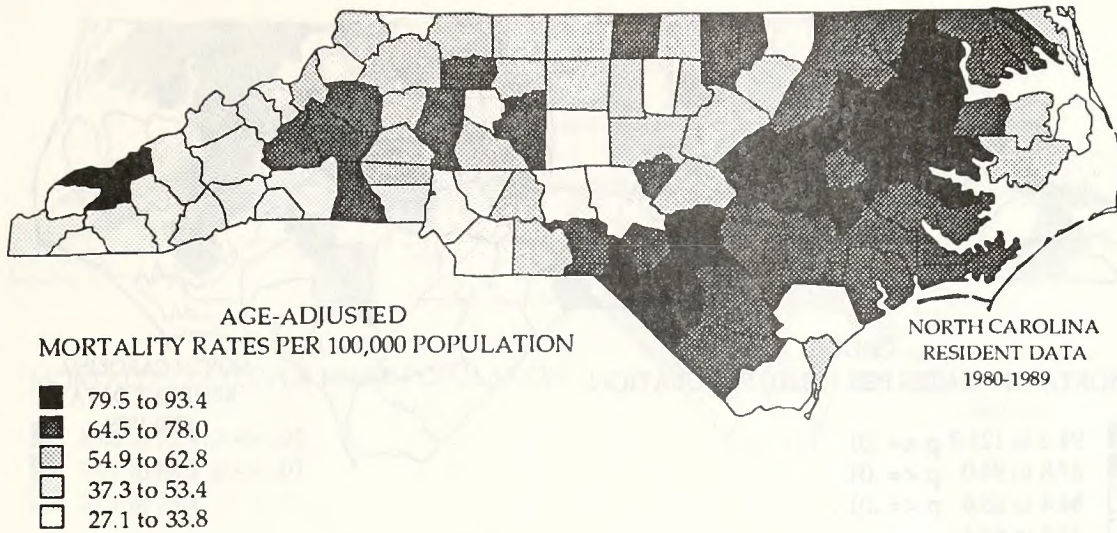
DIABETES MENTIONS  
NONWHITES



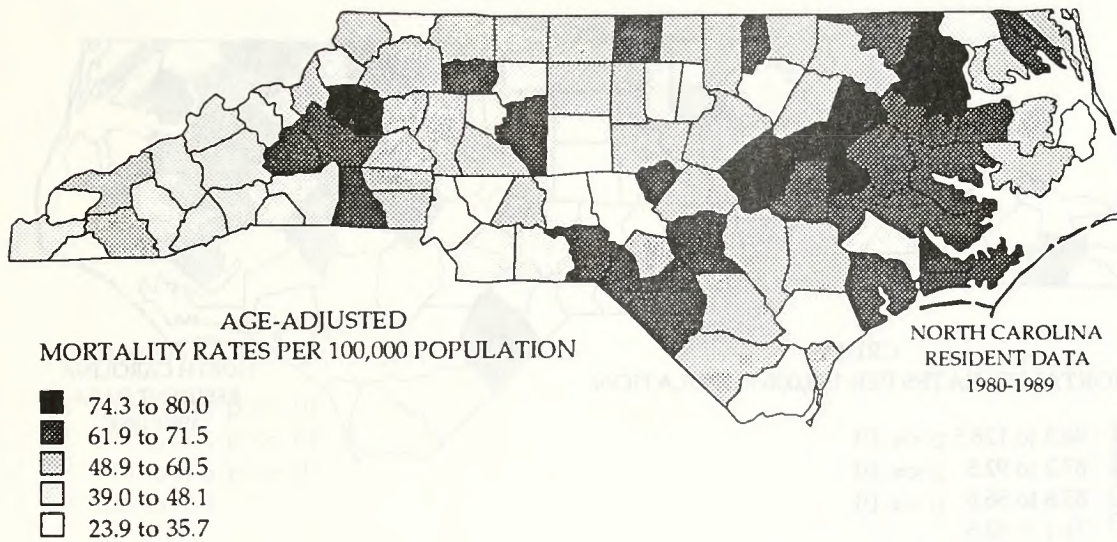


## DIABETES MENTIONS

Figure 8.



## DIABETES MENTIONS WHITES



## DIABETES MENTIONS NONWHITES

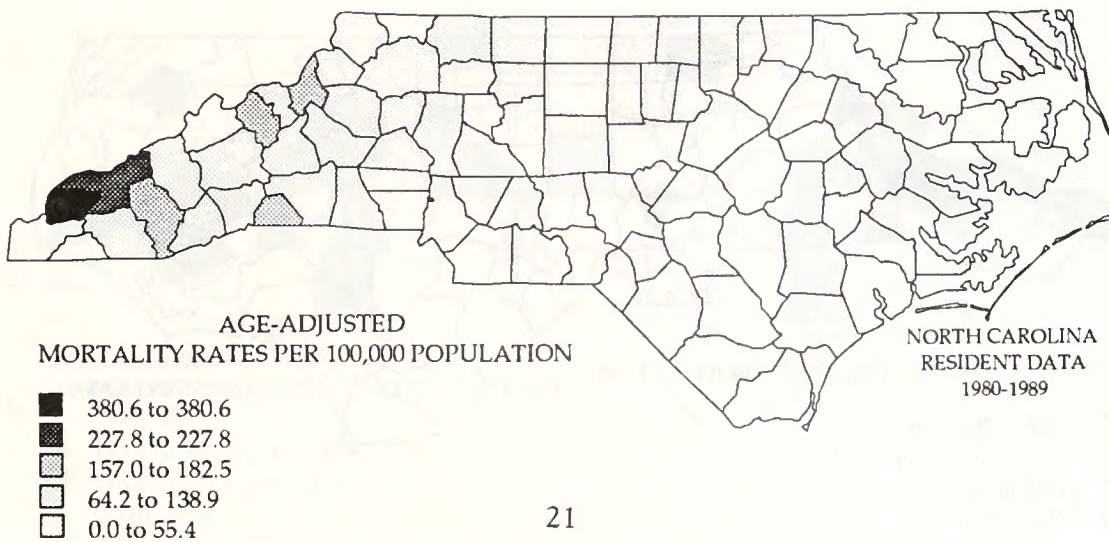
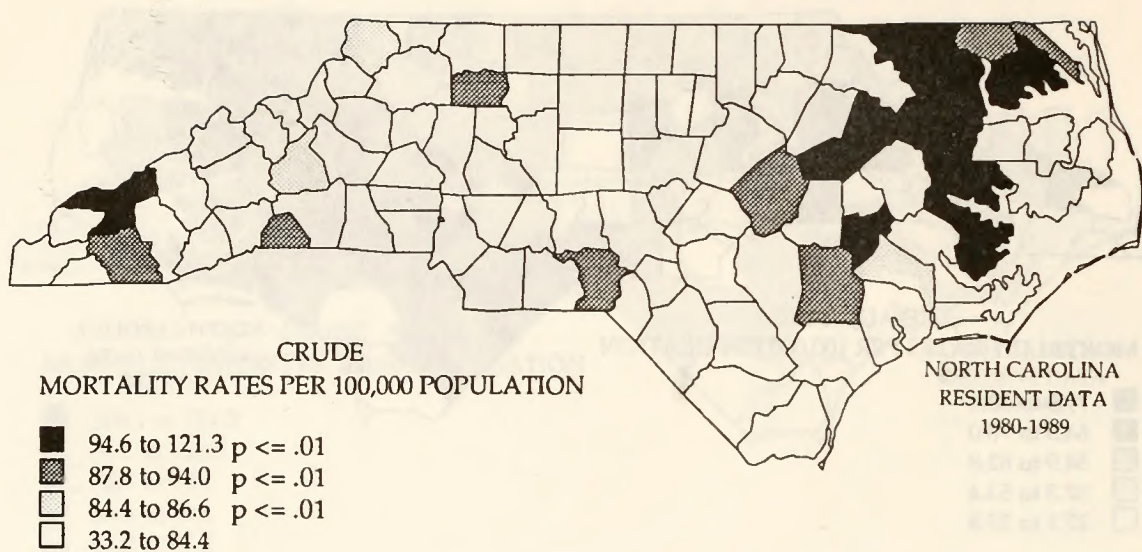


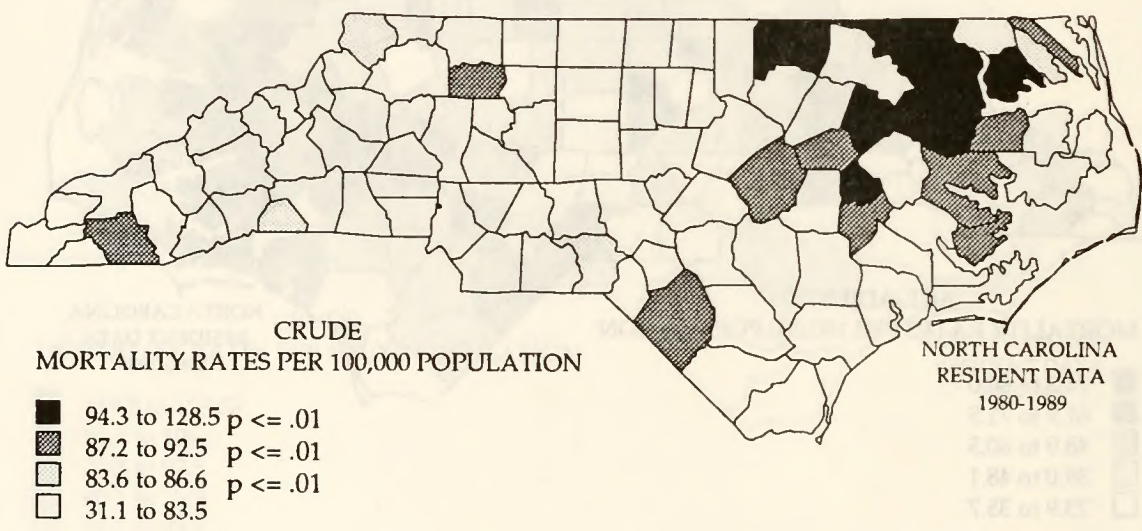


Figure 9.

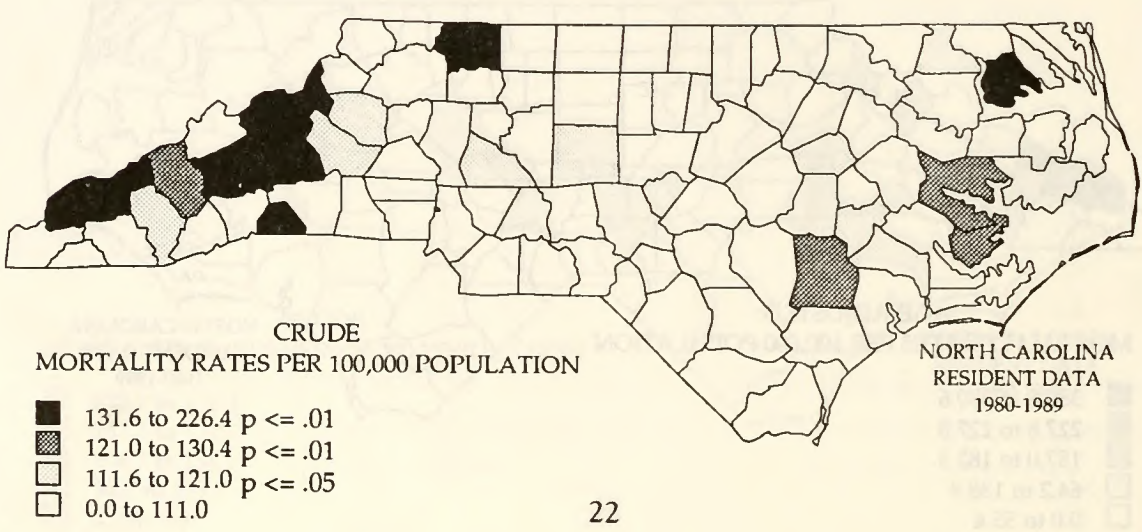
DIABETES MENTIONS



DIABETES MENTIONS  
WHITES



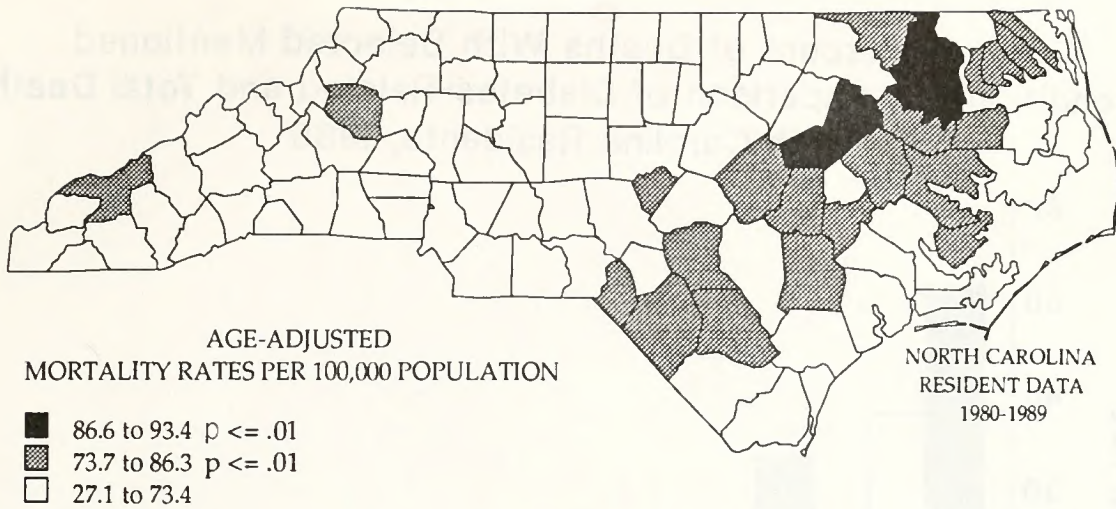
DIABETES MENTIONS  
NONWHITES



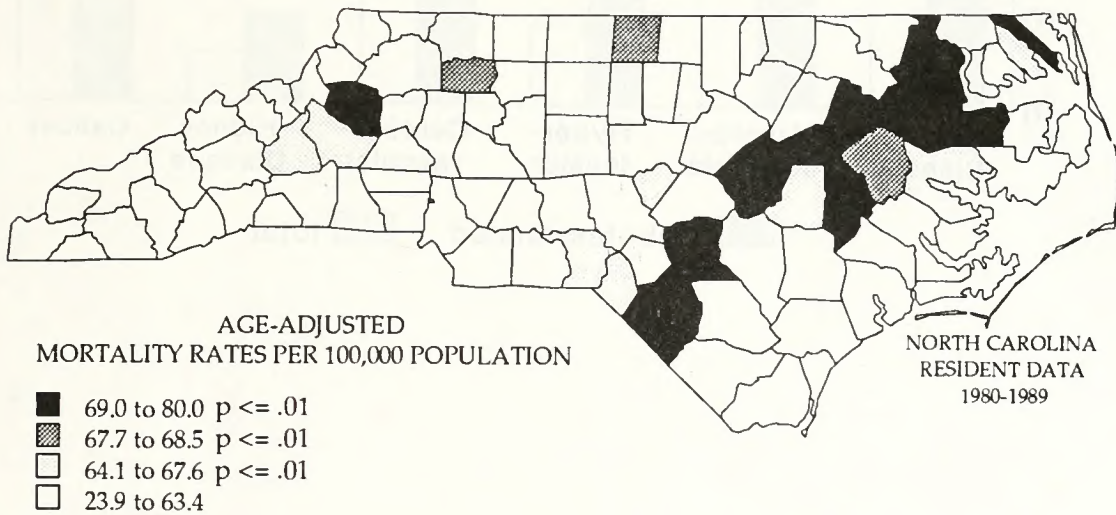


# DIABETES MENTIONS

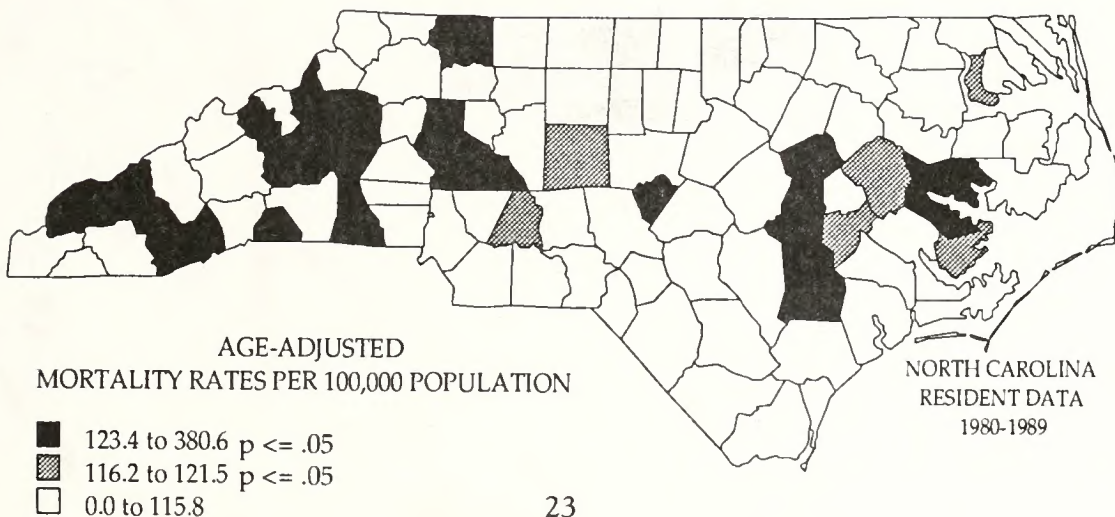
Figure 10.



## DIABETES MENTIONS WHITES

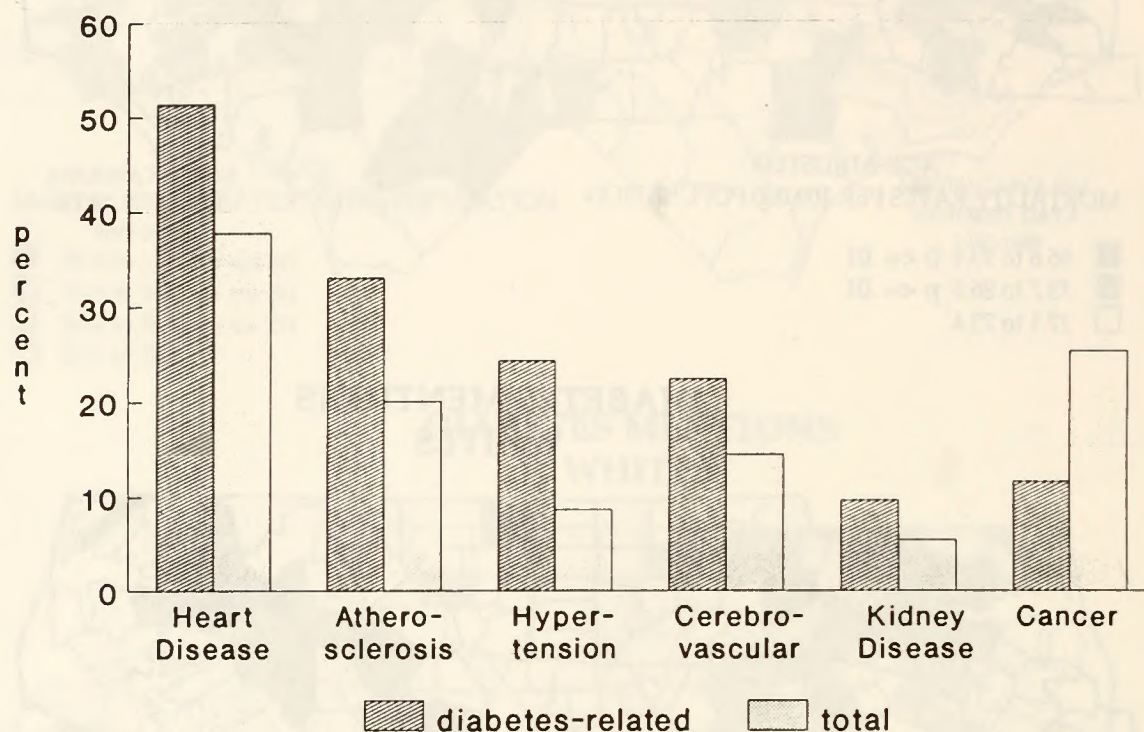


## DIABETES MENTIONS NONWHITES





**Figure 11. Percent of Deaths With Selected Mentioned Conditions: Comparison of Diabetes-Related and Total Deaths North Carolina Residents, 1989**





STATE LIBRARY OF NORTH CAROLINA



3 3091 00739 3747



Department of Environment, Health, and Natural Resources  
State Center for Health and Environmental Statistics  
P.O. Box 29538  
Raleigh, N.C. 27626-0538  
919/733-4728

BULK RATE  
U.S. Postage  
PAID  
Raleigh, N.C. 27626-0538  
Permit No. 1862